

Supplementary Table 1. Frequency of receipt and medical claim codes for specific chemotherapeutic agents

Chemotherapy	HCPCS/CPT codes	Total NHL	AML/MDS cases*
		N (%)	N (%)
Most common agents			
Cyclophosphamide	J8530, J9070, J9080, J9090-J9097	14,040 (41.4)	80 (53.3)
Fludarabine	J9185	3,689 (10.9)	44 (29.3)
Rituximab	J9310	17,552 (51.7)	98 (65.3)
Topoisomerases II inhibitors			
Doxorubicin	J9000-J9001	9,502 (28.0)	51 (34.0)
Mitoxantrone	J9293	1,358 (4.0)	13 (8.7)
Plant Alkaloids			
Vincristine	J9370, J9375, J9380	12,939 (38.1)	59 (39.3)
Colony Stimulating Factors			
G-CSF	J1440-J1441	5,970 (17.6)	55 (36.7)

Abbreviations: acute myeloid leukemia/myelodysplastic syndrome (AML/MDS); granulocyte colony-stimulating factor (G-CSF); granulocyte colony-stimulating factor (GM-CSF); Healthcare Common Procedure Coding System (HCPCS); Current Procedural Technology (CPT); non-Hodgkin lymphoma (NHL).

* Counts and percentages are not reported when less than 10 AML/MDS cases to protect patient confidentiality.

Chemotherapy agents with less than 10 AML/MDS cases include aldesleukin, alemtuzumab, idarubicin, ixabepilone, asparaginase, azacitidine, bendamustine, bevacizumab, bleomycin, bortezomib, busulfan, carboplatin, carmustine, cetuximab, cisplatin, cladribine, clofarabine, cytarabine, dacarbazine, dactinomycin, daunorubicin, decitabine, denileukin, diftitox, docetaxel, epirubicin, etoposide, floxuridine, fluorouracil, gefitinib, gemcitabine, gemtuzumab, GM-CSF, ibritumomab, ifosfamide, interferons (1B, 2A, 2B, A1, N3), irinotecan, leucovorin, lomustine, mechlorethamine, melphalan, methotrexate, mitomycin, nelarabine, oxaliplatin, paclitaxel, panitumumab, pegaspargase, pemetrexed, pentostatin, plicamycin, streptozocin, temsirolimus, teniposide, thiotapec, topotecan, tositumomab, trastuzumab, valrubicin, vinblastine, and vinorelbine.

~ Information on oral chemotherapy agents not captured in study include capecitabine, chlorambucil, cyclophosphamide, levamisole, procarbazine, and temozolomide.

Supplementary Table 2. Frequency of diagnosis and medical claim codes for autoimmune conditions

Autoimmune conditions	HCPCS/CPT codes	Total NHL		AML/MDS cases	
		Prior to NHL N (%)	After NHL* N (%)	Prior to NHL N (%)	After NHL* N (%)
B-cell activating conditions †	conditions below	6,820 (20.1)	8,517 (25.1)	35 (23.3)	55 (36.7)
T-cell activating conditions †	conditions below	15,037 (44.3)	15,928 (47.0)	70 (46.7)	73 (48.7)
By organ system involved					
Systemic/connective tissue		5,334 (15.7)	4,755 (14.0)	28 (18.7)	28 (18.7)
Ankylosing spondylitis	720	944 (2.8)	903 (2.7)	<10 ~	<10 ~
Dermatomyositis/polymyositis	710.3, 710.4	133 (0.4)	106 (0.3)	<10 ~	<10 ~
Felty's syndrome	714.1	39 (0.1)	32 (0.1)	<10 ~	<10 ~
Systemic lupus erythematosus	710	1,216 (3.6)	1,140 (3.4)	<10 ~	<10 ~
Polymyalgia rheumatica	725	786 (2.3)	655 (1.9)	<10 ~	<10 ~
Reactive arthritis	99.3	10 (0.0)	<10 ~	<10 ~	<10 ~
Rheumatic fever	390-392	93 (0.3)	84 (0.2)	<10 ~	<10 ~
Rheumatoid arthritis	714	3,268 (9.6)	2,671 (7.9)	15 (10.0)	16 (10.7)
Sarcoidosis	135	153 (0.5)	168 (0.5)	<10 ~	<10 ~
Sjogren's syndrome	710.2	459 (1.4)	458 (1.4)	<10 ~	<10 ~
Systemic sclerosis/scleroderma	710.1	96 (0.3)	99 (0.3)	<10 ~	<10 ~
Cardiovascular		3,797 (11.2)	5,607 (16.5)	20 (13.3)	21 (14.0)
Chronic rheumatic heart disease	393-398	3,344 (9.9)	5,180 (15.3)	17 (11.3)	18 (12.0)
Giant cell arteritis	446.5	386 (1.1)	332 (1.0)	<10 ~	<10 ~
Systemic vasculitis	446,447.60	545 (1.6)	543 (1.6)	<10 ~	<10 ~
Endocrine		2,791 (8.2)	2,860 (8.4)	16 (10.7)	<10 ~
Addison's disease	255.4	189 (0.6)	581 (1.7)	<10 ~	<10 ~
Chronic thyroiditis/Hashimoto thyroiditis	245.2	344 (1.0)	411 (1.2)	<10 ~	<10 ~
Graves' disease	242	2,344 (6.9)	1,986 (5.9)	16 (10.7)	<10 ~
Primary biliary cirrhosis	571.6	39 (0.1)	61 (0.2)	<10 ~	<10 ~
Skin		6,333 (18.7)	5,433 (16.0)	35 (23.3)	24 (16.0)
Alopecia areata	704.1	59 (0.2)	74 (0.2)	<10 ~	<10 ~
Dermatitis herpetiformis	694	177 (0.5)	210 (0.6)	<10 ~	<10 ~
Discoid lupus erythematosus	695.4	143 (0.4)	128 (0.4)	<10 ~	<10 ~
Localized scleroderma	701	4,920 (14.5)	4,183 (12.3)	30 (20.0)	20 (13.3)
Psoriasis	696	1,532 (4.5)	1,237 (3.6)	<10 ~	<10 ~
Gastrointestinal		4,078 (12.0)	6,495 (19.1)	22 (14.7)	44 (29.3)
Celiac disease	579	438 (1.3)	506 (1.5)	<10 ~	<10 ~
Crohn's disease	555	298 (0.9)	371 (1.1)	<10 ~	<10 ~
Pernicious anemia	281	3,158 (9.3)	5,507 (16.2)	19 (12.7)	39 (26.0)
Ulcerative colitis	556	557 (1.6)	636 (1.9)	<10 ~	<10 ~
Nervous system		240 (0.7)	388 (1.1)	<10 ~	<10 ~
Amyotrophic sclerosis	335.2	27 (0.1)	83 (0.2)	<10 ~	<10 ~
Multiple sclerosis	340	99 (0.3)	153 (0.5)	<10 ~	<10 ~
Myasthenia gravis	358	121 (0.4)	160 (0.5)	<10 ~	<10 ~
Respiratory (Asthma)	493	5,221 (15.4)	5,585 (16.5)	17 (11.3)	31 (20.7)
Autoimmune disease, NOS	279.4	139 (0.4)	170 (0.5)	<10 ~	<10 ~

Abbreviations: acute myeloid leukemia/myelodysplastic syndrome (AML/MDS); Current Procedural Technology (CPT); Healthcare Common Procedure Coding System (HCPCS); non-Hodgkin lymphoma (NHL); not otherwise specified (NOS).

~ Counts and percentages are not reported for less than 10 AML/MDS cases to protect patient confidentiality.

* New claims occurring after NHL but prior to second cancer, death, end of study, or loss to follow-up, with no claims prior to NHL.

† B-cell activating conditions include rheumatoid arthritis, Sjogren's syndrome, discoid lupus erythematosus, reactive arthritis, Felty's syndrome, chronic thyroiditis, systemic/discoid lupus erythematosus, pernicious anemia, and myasthenia gravis. T-cell activating conditions include ankylosing spondylitis, dermatomyositis, polymyalgia rheumatica, sarcoidosis, systemic sclerosis, rheumatic fever, chronic rheumatic heart disease, giant cell arteritis, systemic vasculitis, Addison's disease, Graves' disease, primary biliary cirrhosis, alopecia areata, localized scleroderma, dermatitis herpetiformis, psoriasis, celiac disease, Crohn's disease, ulcerative colitis, amyotrophic sclerosis, multiple sclerosis, and asthma. Hematologic autoimmune conditions (e.g., autoimmune hemolytic anemia, thrombocytopenia) were excluded from consideration because of difficulty distinguishing these diagnoses from manifestations of chemotherapy toxicity.

Supplementary Table 3. Frequency of diagnosis and medical claim codes for infections

Infections	HCPCS/CPT codes	Total NHL		AML/MDS cases	
		Prior to NHL N (%)	After NHL * N (%)	Prior to NHL N (%)	After NHL * N (%)
Respiratory - upper airway					
Laryngitis	464-464.4, 476-476.1	15,043 (44.3)	12,749 (37.6)	72 (48.0)	77 (51.3)
Otitis media	017.4, 055.2, 381.0-381.4, 382, 383.0-383.1	1,699 (5.0)	1,372 (4.0)	<10 ~	<10 ~
Pharyngitis	462,472.1	3,969 (11.7)	2,941 (8.7)	22 (14.7)	13 (8.7)
Sinusitis	461,473	5,508 (16.2)	4,441 (13.1)	28 (18.7)	26 (17.3)
Respiratory - lower airway					
Acute bronchitis	466	10,752 (31.7)	8,963 (26.4)	45 (30.0)	61 (40.7)
Influenza	487	15,069 (44.4)	17,408 (51.3)	70 (46.7)	82 (54.7)
Pneumonia	480-486, 770	11,553 (34.1)	10,038 (29.6)	54 (36.0)	49 (32.7)
Tuberculosis	010-018	1,846 (5.4)	1,278 (3.8)	10 (6.7)	<10 ~
Skin					
Cellulitis	682.9	6,670 (19.7)	12,635 (37.2)	28 (18.7)	59 (39.3)
Herpes zoster	53	303 (0.9)	319 (0.9)	<10 ~	<10 ~
Urinary tract					
Cystitis/pyelonephritis, UTI	599	5,354 (15.8)	7,259 (21.4)	31 (20.7)	29 (19.3)
Prostatitis †	601	14,970 (44.1)	3,753 (8.1)	13 (8.7)	18 (12.0)
Gastrohepatic					
Gastroenteritis	558.9	16,449 (48.5)	17,629 (52.0)	20 (13.3)	15 (10.0)
HBV	070.2-070.3	5,178 (15.3)	4,022 (11.9)	71 (47.3)	91 (60.7)
HCV	070.4, 070.5, 070.7	117 (0.3)	2,430 (17.7)	27 (31.0)	81 (54.0)
		230 (0.7)	5,624 (16.6)	28 (18.7)	25 (28.7)
		369 (1.1)	27 (18.0)	31 (20.7)	<10 ~
			<10 ~	<10 ~	<10 ~

Abbreviations: acute myeloid leukemia/myelodysplastic syndrome (AML/MDS); Current Procedural Technology (CPT); Healthcare Common Procedure Coding System (HCPCS); hepatitis B virus (HBV); hepatitis C virus (HCV); non-Hodgkin lymphoma (NHL); urinary tract infection (UTI).

~ Counts and percentages are not reported for less than 10 AML/MDS cases to protect patient confidentiality.

* New claims occurring after NHL but prior to second cancer, death, end of study, or loss to follow-up, with no claims prior to NHL.

† Among males only.

Supplementary Table 4. Selected characteristics and risk of AML and MDS among 33,922 1-year survivors of first primary NHL

	Total NHL (N=33,922)	AML cases (N=70)			MDS cases (N=80)		
	N (%)	N (%)	HR *	95% CI	N (%)	HR *	95% CI
Age at NHL diagnosis (years)							
65-69	7,096 (20.9)	18 (25.7)			19 (23.8)		
70-74	9,653 (28.5)	23 (32.9)			32 (40.0)		
75-79	9,770 (28.8)	22 (31.4)			26 (32.5)		
80-83	7,403 (21.8)	<10 ~			<10 ~		
Year of NHL diagnosis							
2000-2004	17,026 (50.2)	50 (71.4)			58 (72.5)		
2005-2009	16,896 (49.8)	20 (28.6)			22 (27.5)		
Sex							
Male	16,731 (49.3)	48 (68.6)	1.00	Referent	39 (48.8)	1.00	Referent
Female	17,191 (50.7)	22 (31.4)	0.39	0.23-0.64	41 (51.3)	1.01	0.65-1.58
Race							
White	30,751 (90.7)	64 (91.4)	1.00	Referent	74 (92.5)	1.00	Referent
Other/unknown	3,171 (9.3)	<10 ~	0.94	0.40-2.19	<10 ~	0.79	0.34-1.83
Charlson comorbidity index †							
No comorbidities	8,494 (25.0)	23 (32.9)	1.00	Referent	22 (27.5)	1.00	Referent
1 comorbidity	8,284 (24.4)	18 (25.7)	0.73	0.39-1.36	13 (16.3)	0.58	0.29-1.15
2+ comorbidities	17,041 (50.2)	29 (41.4)	0.55	0.31-0.96	43 (53.8)	1.02	0.60-1.73
Socioeconomic status §							
Lowest quintile	7,572 (22.3)	15 (21.4)	1.00	Referent	14 (17.5)	1.00	Referent
2nd lowest quintile	7,462 (22.0)	17 (24.3)	1.10	0.55-2.20	21 (26.3)	1.49	0.75-2.93
Middle quintile	7,548 (22.3)	16 (22.9)	0.97	0.48-1.98	17 (21.3)	1.18	0.58-2.40
2nd highest quintile	7,032 (20.7)	15 (21.4)	0.93	0.45-1.92	18 (22.5)	1.28	0.63-2.59
Highest quintile	4,003 (11.8)	<10 ~	0.52	0.19-1.44	<10 ~	1.12	0.48-2.61
Missing	305 (0.9)	<10 ~	3.01	0.68-13.33	<10 ~	1.62	0.21-12.43
NHL subtype #							
CLL/SLL	10,441 (30.8)	13 (18.6)	1.00	Referent	22 (27.5)	1.00	Referent
DLBCL	7,802 (23.0)	17 (24.3)	2.06	1.00-4.25	22 (27.5)	1.42	0.79-2.58
FL	5,643 (16.6)	15 (21.4)	2.35	1.11-4.96	15 (18.8)	1.21	0.62-2.34
MZL	3,068 (9.0)	<10 ~	2.23	0.89-5.62	<10 ~	0.82	0.31-2.16
Other	6,968 (20.5)	18 (25.7)	2.38	1.16-4.86	16 (20.0)	1.22	0.64-2.33

Abbreviations: acute myeloid leukemia/myelodysplastic syndrome (AML/MDS); chronic lymphocytic leukemia/small lymphocytic lymphoma (CLL/SLL); diffuse large B-cell lymphoma (DLBCL); follicular lymphoma (FL); International Classification of Diseases for Oncology, 3rd edition (ICD-O-3); marginal zone lymphoma (MZL); non-Hodgkin lymphoma (NHL); Surveillance, Epidemiology and End Results (SEER).

* HR (95% CI) derived from a multivariate model including sex, race, Charlson Index comorbidities, socioeconomic status, NHL subtype, and follow-up time (time-dependent covariate) and stratified by calendar year. Age was used as the time scale.

~ Counts and percentages are not reported for less than 10 AML/MDS cases to protect patient confidentiality.

† Excludes 103 individuals (0.3% of the total population) with missing information on comorbidities.

§ Socioeconomic status derived from census tract variables, does not represent individual status.

First primary NHL subtype defined by ICD-O-3 as DLBCL (9678-9680, 9684 [B-cell]), FL (9690-9691, 9695, 9698), CLL/SLL (9670, 9823), MZL (9689, 9699) and other NHL (9590-9596, 9671, 9673, 9675, 9684 [non B-cell], 9687, 9700-9702, 9705, 9708-9709, 9714-9719, 9727-9729, 9827 [primary site=420-421, 424]).

Supplementary Table 5. Risk of AML after first primary NHL in relation to NHL treatments, autoimmune conditions, and infections

Medical factors †	Prior to NHL diagnosis				After NHL diagnosis *			
	Total NHL N (%)	AML cases N (%)	HR ‡	95% CI	Total NHL N (%)	AML cases N (%)	HR ‡	95% CI
NHL treatment								
Infused chemotherapy §								
None recorded					14,280 (42.1)	18 (25.7)	1.00	Referent
Any fludarabine					3,699 (10.9)	15 (21.4)	3.17	1.52-6.59
Cyclophosphamide (± rituximab)					12,054 (35.5)	29 (41.4)	1.66	0.80-3.43
Rituximab (without fludarabine or cyclophosphamide)					3,802 (11.2)	<10 ~	2.38	1.02-5.56
Granulocyte colony-stimulating factor								
No					27,952 (82.4)	46 (65.7)	1.00	Referent
Yes					5,970 (17.6)	24 (34.3)	1.55	0.87-2.75
Radiotherapy								
No					26,558 (78.3)	57 (81.4)	1.00	Referent
Yes					7,364 (21.7)	13 (18.6)	0.75	0.39-1.43
Autoimmune conditions, by cell type affected #								
B-cell activating conditions	6,820 (20.1)	19 (27.1)	2.17	1.23-3.83	8,517 (25.1)	23 (32.9)	1.59	0.76-3.34
T-cell activating conditions	15,037 (44.3)	31 (44.3)	1.58	0.91-2.75	15,928 (47.0)	33 (47.1)	1.65	0.84-3.26
Autoimmune conditions, by organ system								
Systemic/connective tissue	5,334 (15.7)	16 (22.9)	2.09	1.17-3.76	4,755 (14.0)	11 (15.7)	0.61	0.15-2.52
Rheumatoid arthritis	3,268 (9.6)	<10 ~	1.84	0.89-3.80	2,671 (7.9)	<10 ~	1.11	0.27-4.61
Cardiovascular	3,797 (11.2)	10 (14.3)	1.89	0.94-3.81	5,607 (16.5)	<10 ~	1.21	0.51-2.86
Chronic rheumatic heart disease	3,344 (9.9)	<10 ~	1.69	0.79-3.63	5,180 (15.3)	<10 ~	1.06	0.42-2.69
Endocrine	2,791 (8.2)	<10 ~	1.67	0.74-3.77	2,860 (8.4)	<10 ~	1.10	0.34-3.57
Graves' disease	2,344 (6.9)	<10 ~	1.94	0.86-4.39	1,986 (5.9)	<10 ~	0.57	0.08-4.16
Skin	6,333 (18.7)	16 (22.9)	1.62	0.90-2.91	5,433 (16.0)	13 (18.6)	1.94	0.89-4.24
Localized scleroderma	4,920 (14.5)	12 (17.1)	1.49	0.78-2.85	4,183 (12.3)	10 (14.3)	1.84	0.82-4.17
Gastrointestinal	4,078 (12.0)	12 (17.1)	2.10	1.09-4.04	6,495 (19.1)	18 (25.7)	2.20	1.14-4.25
Pernicious anemia	3,158 (9.3)	10 (14.3)	2.32	1.15-4.68	5,507 (16.2)	15 (21.4)	2.05	1.02-4.14
Nervous system	240 (0.7)	<10 ~	0.00		388 (1.1)	<10 ~	3.36	0.45-25.09
Asthma	5,221 (15.4)	<10 ~	0.85	0.36-2.01	5,585 (16.5)	13 (18.6)	2.50	1.20-5.23
Infections, by organ system								
Respiratory - upper airway	15,043 (44.3)	31 (44.3)	1.24	0.73-2.12	12,749 (37.6)	28 (40.0)	1.31	0.64-2.65
Otitis media	3,969 (11.7)	11 (15.7)	1.56	0.80-3.02	2,941 (8.7)	<10 ~	1.72	0.67-4.38
Pharyngitis	5,508 (16.2)	11 (15.7)	1.08	0.56-2.09	4,441 (13.1)	<10 ~	1.10	0.46-2.61
Sinusitis	10,752 (31.7)	18 (25.7)	0.94	0.53-1.67	8,963 (26.4)	21 (30.0)	1.60	0.83-3.09
Respiratory - lower airway	15,069 (44.4)	32 (45.7)	1.36	0.78-2.37	17,408 (51.3)	36 (51.4)	1.13	0.56-2.25
Acute bronchitis	11,553 (34.1)	24 (34.3)	1.11	0.66-1.88	10,038 (29.6)	18 (25.7)	0.63	0.26-1.52
Influenza	1,846 (5.4)	<10 ~	0.80	0.25-2.59	1,278 (3.8)	<10 ~	1.95	0.60-6.41
Pneumonia	6,670 (19.7)	12 (17.1)	1.29	0.66-2.53	12,635 (37.2)	27 (38.6)	1.96	1.11-3.46
Skin	5,354 (15.8)	15 (21.4)	1.65	0.91-2.98	7,259 (21.4)	<10 ~	0.79	0.35-1.77
Cellulitis	2,948 (8.7)	<10 ~	1.18	0.51-2.77	3,943 (11.6)	<10 ~	1.12	0.44-2.83
Herpes zoster	2,753 (8.1)	<10 ~	1.82	0.89-3.74	4,022 (11.9)	<10 ~	0.67	0.24-1.88
Urinary tract	16,449 (48.5)	35 (50.0)	1.52	0.87-2.67	18,427 (54.3)	39 (55.7)	1.56	0.78-3.14
Cystitis/pyelonephritis, UTI	14,970 (44.1)	30 (42.9)	1.41	0.81-2.44	17,629 (52.0)	33 (47.1)	1.29	0.65-2.57
Prostatitis **	3,817 (22.8)	12 (25.0)	1.28	0.64-2.54	2,430 (17.7)	11 (22.9)	1.73	0.65-4.64
Gastrohepatitis	5,410 (15.9)	12 (17.1)	1.34	0.70-2.56	5,624 (16.6)	16 (22.9)	1.78	0.88-3.60
Gastroenteritis	5,178 (15.3)	12 (17.1)	1.42	0.74-2.72	5,202 (15.3)	16 (22.9)	1.91	0.94-3.86

Abbreviations: acute myeloid leukemia (AML); confidence interval (CI); hazard ratio (HR); non-Hodgkin lymphoma (NHL); urinary tract infections (UTI).

~ Counts and percentages are not reported for less than 10 AML/MDS cases to protect patient confidentiality.

* New claims occurring after NHL but prior to second cancer, death, end of study, or loss to follow-up, with no claims prior to NHL; diagnoses were evaluated as time-dependent covariates in the Cox model, described further below.

† Detailed information on ascertainment of NHL treatments, autoimmune conditions, and infections is provided in Supplementary Tables 1-3.

‡ HR (95% CI) were adjusted for sex, race, Charlson Index comorbidities, socioeconomic status, and follow-up time (time-dependent covariate), and stratified by calendar year and NHL subtype. Age was used as the time scale. Time-dependent covariates were used to indicate receipt of specific NHL treatments during follow-up based on timing of initiation of therapy, with individuals with no infused chemotherapy claims comprising the referent group. For analyses of autoimmune conditions and infections, models were additionally adjusted for NHL treatments and individuals with no history of the condition of interest comprised the referent group.

§ Excludes 87 individuals (0.3% of the total population) who received other infused chemotherapeutic agents (did not receive rituximab, fludarabine, cyclophosphamide, or G-CSF), as detailed in Supplementary Table 1.

B-cell activating conditions include rheumatoid arthritis, Sjögren's syndrome, discoid lupus erythematosus, reactive arthritis, Felty's syndrome, chronic thyroiditis, systemic/discoid lupus erythematosus, pernicious anemia, and myasthenia gravis. T-cell activating conditions include ankylosing spondylitis, dermatomyositis, polymyalgia rheumatica, sarcoidosis, systemic sclerosis, rheumatic fever, chronic rheumatic heart disease, giant cell arteritis, systemic vasculitis, Addison's disease, Graves' disease, primary biliary cirrhosis, alopecia areata, localized scleroderma, dermatitis herpetiformis, psoriasis, celiac disease, Crohn's disease, ulcerative colitis, amyotrophic sclerosis, multiple sclerosis, and asthma. Hematologic autoimmune conditions (e.g., autoimmune hemolytic anemia, thrombocytopenia) were excluded from consideration because of difficulty distinguishing these diagnoses from manifestations of chemotherapy toxicity.

** Among males only.

Supplementary Table 6. Risk of MDS after first primary NHL in relation to NHL treatments, autoimmune conditions, and infections

Medical factors †	Prior to NHL diagnosis				After NHL diagnosis *			
	Total NHL N (%)	MDS cases N (%)	HR ‡	95% CI	Total NHL N (%)	MDS cases N (%)	HR ‡	95% CI
NHL treatment								
Infused chemotherapy §								
None recorded					14,280 (42.1)	18 (22.5)	1.00	Referent
Any fludarabine					3,699 (10.9)	29 (36.3)	5.94	3.10-11.37
Cyclophosphamide (± rituximab)					12,054 (35.5)	28 (35.0)	1.13	0.54-2.36
Rituximab (without fludarabine or cyclophosphamide)					3,802 (11.2)	<10 ~	1.28	0.46-3.50
Granulocyte colony-stimulating factor								
No					27,952 (82.4)	49 (61.3)	1.00	Referent
Yes					5,970 (17.6)	31 (38.8)	1.84	1.09-3.08
Radiotherapy								
No					26,558 (78.3)	65 (81.3)	1.00	Referent
Yes					7,364 (21.7)	15 (18.8)	0.82	0.44-1.53
Autoimmune conditions, by cell type affected #								
B-cell activating conditions	6,820 (20.1)	16 (20.0)	1.48	0.81-2.68	8,517 (25.1)	32 (40.0)	2.63	1.50-4.59
T-cell activating conditions	15,037 (44.3)	39 (48.8)	1.97	1.12-3.46	15,928 (47.0)	40 (50.0)	1.83	0.95-3.52
Autoimmune conditions, by organ system								
Systemic/connective tissue	5,334 (15.7)	12 (15.0)	1.20	0.63-2.27	4,755 (14.0)	17 (21.3)	1.57	0.74-3.34
Rheumatoid arthritis	3,268 (9.6)	<10 ~	0.87	0.37-2.05	2,671 (7.9)	11 (13.8)	1.68	0.66-4.25
Cardiovascular	3,797 (11.2)	10 (12.5)	1.42	0.71-2.84	5,607 (16.5)	12 (15.0)	1.05	0.49-2.23
Chronic rheumatic heart disease	3,344 (9.9)	<10 ~	1.46	0.71-3.00	5,180 (15.3)	10 (12.5)	0.99	0.45-2.20
Endocrine	2,791 (8.2)	<10 ~	1.58	0.77-3.23	2,860 (8.4)	<10 ~	0.41	0.10-1.69
Graves' disease	2,344 (6.9)	<10 ~	1.94	0.95-3.98	1,986 (5.9)	<10 ~	0.30	0.04-2.20
Skin	6,333 (18.7)	19 (23.8)	1.43	0.84-2.46	5,433 (16.0)	11 (13.8)	0.61	0.22-1.70
Localized scleroderma	4,920 (14.5)	18 (22.5)	1.81	1.04-3.14	4,183 (12.3)	10 (12.5)	0.73	0.26-2.05
Gastrointestinal	4,078 (12.0)	10 (12.5)	1.59	0.79-3.20	6,495 (19.1)	26 (32.5)	2.95	1.71-5.09
Pernicious anemia	3,158 (9.3)	<10 ~	1.91	0.93-3.96	5,507 (16.2)	24 (30.0)	3.00	1.72-5.23
Nervous system	240 (0.7)	<10 ~	3.41	0.80-14.50	388 (1.1)	<10 ~	0.00	
Asthma	5,221 (15.4)	11 (13.8)	1.23	0.63-2.41	5,585 (16.5)	18 (22.5)	2.35	1.22-4.53
Infections, by organ system								
Respiratory - upper airway	15,043 (44.3)	41 (51.3)	2.28	1.28-4.07	12,749 (37.6)	49 (61.3)	2.95	1.51-5.76
Otitis media	3,969 (11.7)	11 (13.8)	1.20	0.62-2.31	2,941 (8.7)	<10 ~	0.71	0.22-2.30
Pharyngitis	5,508 (16.2)	17 (21.3)	1.59	0.91-2.78	4,441 (13.1)	17 (21.3)	1.62	0.80-3.28
Sinusitis	10,752 (31.7)	27 (33.8)	1.72	1.00-2.96	8,963 (26.4)	40 (50.0)	3.49	1.95-6.22
Respiratory - lower airway	15,069 (44.4)	38 (47.5)	1.88	1.05-3.37	17,408 (51.3)	46 (57.5)	1.98	1.04-3.80
Acute bronchitis	11,553 (34.1)	30 (37.5)	1.59	0.95-2.68	10,038 (29.6)	31 (38.8)	1.95	1.05-3.62
Influenza	1,846 (5.4)	<10 ~	1.82	0.82-4.04	1,278 (3.8)	<10 ~	1.27	0.39-4.16
Pneumonia	6,670 (19.7)	16 (20.0)	1.44	0.78-2.65	12,635 (37.2)	32 (40.0)	1.84	1.07-3.15
Skin	5,354 (15.8)	16 (20.0)	1.64	0.92-2.93	7,259 (21.4)	20 (25.0)	1.04	0.55-2.00
Cellulitis	2,948 (8.7)	<10 ~	1.39	0.63-3.07	3,943 (11.6)	12 (15.0)	2.00	1.03-3.88
Herpes zoster	2,753 (8.1)	11 (13.8)	2.06	1.07-3.99	4,022 (11.9)	11 (13.8)	1.02	0.48-2.17
Urinary tract	16,449 (48.5)	36 (45.0)	1.41	0.80-2.47	18,427 (54.3)	52 (65.0)	2.18	1.17-4.06
Cystitis/pyelonephritis, UTI	14,970 (44.1)	29 (36.3)	1.23	0.70-2.18	17,629 (52.0)	48 (60.0)	2.48	1.38-4.43
Prostatitis **	3,817 (22.8)	15 (38.5)	2.94	1.40-6.15	2,430 (17.7)	14 (35.9)	4.16	1.63-10.56
Gastrohepatitis	5,410 (15.9)	16 (20.0)	1.66	0.93-2.98	5,624 (16.6)	15 (18.8)	1.71	0.89-3.28
Gastroenteritis	5,178 (15.3)	15 (18.8)	1.62	0.89-2.95	5,202 (15.3)	15 (18.8)	1.78	0.93-3.41

Abbreviations: confidence interval (CI); hazard ratio (HR); myelodysplastic syndrome (MDS); non-Hodgkin lymphoma (NHL); urinary tract infections (UTI).

~ Counts and percentages are not reported for less than 10 AML/MDS cases to protect patient confidentiality.

* New claims occurring after NHL but prior to second cancer, death, end of study, or loss to follow-up, with no claims prior to NHL; diagnoses were evaluated as time-dependent covariates in the Cox model, described further below.

† Detailed information on ascertainment of NHL treatments, autoimmune conditions, and infections is provided in Supplementary Tables 1-3.

‡ HR (95% CI) were adjusted for sex, race, Charlson Index comorbidities, socioeconomic status, and follow-up time (time-dependent covariate), and stratified by calendar year and NHL subtype. Age was used as the time scale. Time-dependent covariates were used to indicate receipt of specific NHL treatments during follow-up based on timing of initiation of therapy, with individuals with no infused chemotherapy claims comprising the referent group. For analyses of autoimmune conditions and infections, models were additionally adjusted for NHL treatments and individuals with no history of the condition of interest comprised the referent group.

§ Excludes 87 individuals (0.3% of the total population) who received other infused chemotherapeutic agents (did not receive rituximab, fludarabine, cyclophosphamide, or G-CSF), as detailed in Supplementary Table 1.

B-cell activating conditions include rheumatoid arthritis, Sjögren's syndrome, discoid lupus erythematosus, reactive arthritis, Felty's syndrome, chronic thyroiditis, systemic/discoid lupus erythematosus, pernicious anemia, and myasthenia gravis. T-cell activating conditions include ankylosing spondylitis, dermatomyositis, polymyalgia rheumatica, sarcoidosis, systemic sclerosis, rheumatic fever, chronic rheumatic heart disease, giant cell arteritis, systemic vasculitis, Addison's disease, Graves' disease, primary biliary cirrhosis, alopecia areata, localized scleroderma, dermatitis herpetiformis, psoriasis, celiac disease, Crohn's disease, ulcerative colitis, amyotrophic sclerosis, multiple sclerosis, and asthma. Hematologic autoimmune conditions (e.g., autoimmune hemolytic anemia, thrombocytopenia) were excluded from consideration because of difficulty distinguishing these diagnoses from manifestations of chemotherapy toxicity.

** Among males only.